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Harold L. Brode

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Harold L. Brode*

The RAND Corporation, Santa Monica, California

How safe or unsafe will Southern Californians be in the event of nuclear attack? Is survival possible? What is the likelihood of attack? What if anything can local residents do to improve their chances of survival?

In recent years much attention has been given to such questions, with many tentative answers suggested, and yet the possibility of thermonuclear war has been with us and growing for more than a decade. To many of us who live in this area, there remain some personal decisions to make, and some planning for what we and our families and friends should do in any future major disaster of either natural or political cause.

In fact, we would not be very safe if a nuclear attack occurred, and considering the enormous destruction caused by such attack, it can never be unlikely enough to be safely ignored. Yet survival is possible for many of us and there is much that we can do to enhance that possibility.

IS WAR LIKELY?

Just what likelihood is there of attack? How imminent or probable is such a war? What are our chances of avoiding a worldwide thermonuclear holocaust this year? In the next five years? In the next ten or fifteen? It hasn't happened yet, but how close have we come in the past? History may someday reveal just how close we were at the time of the U-2 incident, or at the time of the Berlin wall-building of last fall, or during the Korean or Indo-China conflicts, or in the Congo struggle, or the Hungarian revolt, or now recently Cuba; but whatever low probability we assign to such possibilities, then or now, the eventual likelihood can become appreciable when we continue these risks off into the future indefinitely.

Is thermonuclear war so horrible that it can't happen? Each age has had its military developments that were to make war too horrible and thus end such conflicts forever. The crossbow was one such invention, and although it did away with the knights in armour, it didn't halt wars.

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Nobel thought his explosives were another inhibition to wars. Poison gas, the machine gun, the tank, and the submarine from World War I were all at one time considered in the same light as being tools of combat which made war too horrible to pursue. Many of us now feel that nuclear weapons have finally made war truly impractical, some say impossible; but the term "the ultimate weapon" is too loosely applied, since weapons are still being made more and more efficient and more and more devastating. In fact history lends little comfort to this notion that the use of armed force can ever become old fashioned; most of history is itself a chronology of conflicts. War can hardly be expected to become less likely in the future until and unless the very nature of man is altered, because naked force and not sweet reason is still all that seems effective against world tyrants even in this nuclear age. For this reason military budgets and war plans still are the most expensive features of national budgets, and no one has suggested a scheme for complete control as long as armaments still exist and current conflicts still continue. National ambitions are still most easily accomplished through the use or display of military might.

With the evolution of weapons systems involving vast numbers of weapons ready for instantaneous response, and with the increase in both weapon accuracies and destructive powers, the chances of accidental war have increased significantly. We can never be sure that at some future date some local conflict won't escalate into intercontinental exchanges of thermonuclear weapons. We can't avoid, in fact we can almost count on, new and presently unforeseen technological and political circumstances which will lead to new possibilities for initiating war. Who among us could feel confident in predicting no more wars?

WHAT CAN WE ANTICIPATE?

It is extremely difficult to imagine what such a conflict would do to our city if it occurs ten or fifteen years from now. It is not even easy to predict what our city will be like by then <u>without</u> the destruction of war. Even if war were to occur <u>now</u>, it is far from clear what the results would be for us.

But, what we can usefully do is to consider some reasonable or possible disaster situations and assess the consequences of them for the Southern California area.

WHAT WARNING CAN WE EXPECT?

If such an attack were the result of an accidental exchange, or were the outgrowth of some local conflict elsewhere in the world, then at least we could expect to have some warning. We could then prepare ourselves and seek to improve our protection by as much as time and space would allow. Although official civil defense plans no longer contemplate evacuation, we could even imagine some circumstances in which moving portions of the population to areas remote from probable targets could be feasible. If we have weeks or months of warning, a certain amount of such movement would be inevitable. An enforced vacation with the grandparents on the farm, or an extended trip to a resort area would not be out of the question for many of us.

But even the fearful "surprise attack" has little chance of occurring with anything like simultaneity and complete surprise. Standing hundreds of missiles on their ends and preparing them for firing with precision and timely arrival on targets spread around the world on continents thousands of miles apart is not an operation to be readily carried off without some premature firings and without many misfires and postponements. (Note the many holds in count-downs in our practice shots, and recall the failure records!) With many tens of thousands of people involved and many observable preparations necessary, the launching of hundreds of ICBM is not an operation easily kept secret.

The problems of coordinating offshore submarine and bomber force attacks with massive missile launchings would be even greater and equally hard to hide. The frantic defensive warmups of fighters, radars, rocketry teams all around his borders would be an important preparation by an enemy about to provoke our retaliation. The massive population evacuations and civil defense preparations necessary to save the most of their own peoples lives once they are committed to attack

would be hard to pass off as an ordinary drill and impossible to hide from the rest of the world. Any country that might expect to survive after attacking us must certainly consider extensive civil defense measures some of which would require days or even weeks to carry out.

A truly surprise attack is no longer a simple matter of sailing a fleet up to one or two fortifications and suddenly bombarding them. Now, under the threat of massive retaliation (and with the need to minimize its devastation), any reasonably planned attack must require too vast a coordinated effort and too obvious an intensity of military activity in preparation to remain entirely unexpected, and to come off without hours or days or even weeks of some kinds of warning. We will have warning, but what will we do with it?

WHERE WOULD THE BOMBS FALL?

In the foreseeable future any rational attack (although rationality is hardly to be counted on in circumstances which could lead to an atomic attack) must aim first and foremost at blunting our ability to strike back. We are deliberately and intensively working to make our forces as difficult to destroy as is possible. Even crediting an enemy with many more weapons than current published estimates suggest, the existing U.S. forces present so many dispersed and in some cases hardened targets that even applying all an enemy's weapons to the annihilation of these forces could not hope to destroy them entirely. Yet, for every weapon they might use against other targets such as our cities, they must expect increased destruction in their own cities from our retaliating forces which they thus allow to survive. In such circumstances we could anticipate direct attacks on urban centers only in subsequent days of a war when reserve forces have been erected and launched, and when military targets are no longer identifiable or as important.

Although there is the strong possibility that we may have ample warning and that we may not be under direct attack in our cities, our chances of becoming casualties in such an attack can still be grimly high without some reasonable protection from thermonuclear effects or

with no provisions for our continued health and wellbeing in the subsequent post attack confusion. Under such an attack, shelter and planning can lead to immense differences in our chances for survival, and in the nation's casualties.

Since we cannot count on an enemy being so rational as to limit his attack plans to those which seek only to destroy our retaliation capability thus minimizing his losses, we should also consider various other possibilities including massive attacks on our cities. There is, after all, a long history of essentially suicidal military actions such as the Kamakazi attacks by the Japanese. The Germans with only slight rationality leveled Rotterdam and Coventry. We ourselves had our Doolittle raid on Tokyo. We have seen that it is all too easy when passions are hot to allow military objectives and national policy to be guided more by hatred or compassion than by judgement and more by vengeance or virtue than by wisdom.

WHAT IS OUR DEFENSE?

If an enemy chooses to devastate our urban centers, to kill us in our homes, our survival must then require more sophisticated countermeasures. Fallout shelters become inadequate protection. Protection should be provided against the effects of blast and fire as well as against nuclear radiations of greater intensity. But at some level of attack even the best of shelters fail without more active defense measures. (No castle was so well constructed that it did not still require defenders to man its battlements.) Without an extremely reliable defense system capable of stopping all bombers and destroying all missiles, an enemy can indeed make rubble of most of our metropoli, but with blast shelters designed to protect against the intrusion of hot and poisonous air from fires or from fallout dust, and built to provide shielding from the direct nuclear radiation as well as from the fallout, <u>many people even in devastated areas could expect to survive</u>. In nearby and suburban regions it is not necessary for anyone to perish. Here in the Los Angeles area, with its many

square miles of urban development, we might still expect to be miles away from any burst points. Again, stopping to consider the many thousands of square miles of city within our own country, it must be many years before an enemy could amass the weapons and delivery means to mount an attack so intense as to collapse even modest blast shelters in any but selected regions of major targeted areas.

HOW CLOSE TO OUR HOMES?

In the event of a thermonuclear attack on military installations we should expect heavy attack on Vandenburg (more than eighty miles west of Santa Monica), and on bomber bases of the Strategic Air Command such as March Field south of Riverside (and something more than forty-five miles from Santa Monica). But as long as our bombers pose a retaliatory threat to a potential attacker, any base from which they could operate may also be subject to enemy weapons. Consequently, airfields with long runways and adequate facilities, such as Edwards Air Force Base, International Airfield here in Los Angeles and Long Beach Municipal Airfield, and many hundreds of other such fields across the country and around the world could also be targets. Los Angeles International Airfield is less than ten miles from Santa Monica.

WHAT EFFECTS WILL SUCH BURSTS HAVE?

If attack is limited to current bomber and missile bases, most Southern Californians need expect only moderate and no serious blast or thermal effects, but fallout could be lethal if shelter was not available. If attack should spread to include nearer bursts, then we need shelters which can resist blast. How difficult and expensive is it to provide blast protection to a shelter? Our big missile launch sites are built to withstand blast pressures of as much as 300 to 1000 psi (pounds per square inch). From a megaton explosion, then, such installations would be damaged only if the burst were within a half-mile of them. From Khruschev's hundred megatons they survive beyond

two miles. From the same big bombs a 100 psi shelter survives if it is three miles or more from the burst. A shelter which provides only twenty-five psi blast protection can stand at five miles from a 100 megaton burst. (From a megaton explosion it would be safe at a mile.)

Such standard shelter models as that included in the recent Los Angeles County shelter proposal provide considerably more than 25 psi resistance as well as protection from fire and radiation effects, and at an expense not a great deal more than required to furnish fallout protection alone. But even less protection than this could save many lives and could be more than adequate in Santa Monica. A 10 psi shelter would survive at two miles from a megaton explosion, or stand at nine miles from 100 megatons, and may therefore be safe from the effects of a huge explosion elsewhere in the city, such as International Airfield. Such blast protection is impressively better than what our homes can stand...at 2 psi serious damage can occur to many residential structures, and at 5 psi most of our homes and other structures, will be down. Two psi extends as far as 24 miles from a 100 megaton burst, 11 miles from 10 megatons and 5 miles from 1 megaton bursts.

WHAT IS ADEQUATE SHELTER?

Although our homes offer little shielding from fallout and only slight protection from the blast effects, it is fortunately true that one substance (literally dirt cheap) will go a long ways toward providing protection from both: earth cover. Shielding from the fallout radiation requires mass...it matters not too much what kind of material so long as there is a large thickness of it to absorb the penetrating nuclear rays. Likewise, for the transient blast of high pressure, high velocity air, a massive cover can absorb such highly impulsive loads, transmitting very little of the high pressures to structures beneath it. As a consequence, a piece of corrugated culvert pipe or a Quonset Hut (which offers little shielding from radiation in itself and which would collapse most readily if left above ground and exposed to a blast) can indeed withstand high loads when buried below ground and will offer adequate shielding.

With some care to minimize free roof spans in shelters and some attention to entrance details, very satisfactory blast resistance can be counted on. With some thought to the ventilation and air reserve problems and some means of closing off the air intake from the exterior environment during either local fires or during wind storms laden with fallout dust, a shelter can become quite safe from the consequences of fire and stray radiation as well as safer from chemical and biological attacks if such were ever to occur.

QUICK AND DIRTY SHELTERS

Lacking the perspicacity to have provided such complete shelter months in advance of its emergency use, and finding ourselves faced with possible attack in a matter of days, we can still enhance our chances of survival by bending to the shovel and piling dirt on top of any handy cover for a primitive shelter. Dig under the patio or garage floor slab, or dig a pit, cover it with house or garage doors or durable wood or plywood or steel or other supporting members and shovel the excavated dirt on top. The openings at ends can be sandbagged or bulkheaded, and where ventilation and entrance space is left, some blast and radiation may be expected to enter. While far from ideal, such primitive measures would in many cases mean the difference between probable death and likely survival. The blast itself is less likely to be lethal (at pressures less than 100 psi) than the violent motions and flying missiles produced by the blast in the open or above ground in buildings. The reduction in radiation exposure may be more than adequate, and fallout radiation can be further blocked by further digging once the initial blast has passed.

WILL FIRESTORMS MAKE EVEN GOOD SHELTERS UNINHABITABLE?

A firestorm is much like a huge bonfire. It takes a combination of at least three important factors to make a successful bonfire. (1) It takes a high concentration of fuel. If you have ever tried to build a fire with too few twigs, you know how quickly the flame

goes out and the fire dissipates. (2) It takes special meteorological conditions which is a fancy way of saying you can't build a good fire with damp wood or with a wind blowing. We are all familiar with the consequences of both the effects of damp wood and too much wind. In the firestorm the winds do just what they do to a bonfire - they destroy the draft created by the rising column of hot air and so reduce the self-fanning effect of a good bonfire. (3) Finally, it takes a match to light the fuel. A nuclear explosion, particularly if large yield and burst above the ground, is an excellent fire starter; but in Southern California we have few areas where the fuel is concentrated enough to feed the firestorm development. Where something like 40% built-up coverage with flammable structures has been seen to be the rule in past urban firestorms, Southern California runs to little more than 10% coverage with homes or buildings and not all flammable. Homes burning separately or together can cause intense heat in the immediate vicinity, but at no time outside the houses could one expect significant oxygen depletion nor would air taken into backyard or external shelters be superheated although it could be smoke-laden. In most cases a house afire is completely burned out in less than two hours, so that, if it were considered necessary, a shelter could be closed up for most of that time without suffocating the occupants.

WHERE DO WE STAND?

In short, we need and can have shelters. They can be useful and can be occupied at the time of danger, since there will be ample warning with many if not most possible thermonuclear attacks. We may not be attacked directly in our cities, but should plan for blast protection since even an attack against military targets only would cause blast damage and injuries in many cities, particularly when very large yield weapons are used. (If we were so fortunate as to have an active air defense against such attacks we might still need blast protection from the fringe or accidental effects of defensively deployed nuclear bursts.) If caught without prepared shelters,

even crude last minute earth excavations could spare many lives.

Shelter has not been provided for us by any level of government. The federal shelter survey is pathetically inadequate and has not created a single new shelter, only identified fallout (not blast) shelter spaces. The county plan for shelter construction has lanquished for want of a small fraction of the money already spent in the county for flood control. The city assures us that everything has been taken care of and we are in excellent civil defense shape (whatever that can mean) yet no plan for massive emergency aid from outside the area is included and no training in fire fighting and rescue work extends beyond the existing police and fire crews. In an extensive emergency such as occurred in World War II bombing raids (Tokyo, Berlin, Hiroshima) and in major earthquake disasters as in Chile and Iran or as in the Texas City explosion, organized relief and rescue came only after agencies from outside of the disaster area entered and took action. The best organized local emergency operations cannot hope to cope with their own chaos without a guaranteed surviving command and a protected center for communications and operations. Even then the few police and firemen on the daily force must be augmented by many more trained volunteers or auxiliaries - trained in the very problems of disaster rescue and relief. Fires must be fought without water in the mains, with streets impassable under debris, with thousands of individual fires burning simultaneously. Rescue operations, shelter preparation and management, provision of emergency medical aid on a grand scale cannot be managed nor even guided by city employees alone, no matter how sincere the city manager may be in declaring them "ready".

We are not prepared, we have not supported well enough those agencies willing to help prepare us, and not having done anything to insure our survival, we have given almost no thought to the post carnage problems of life and rehabilitation.

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